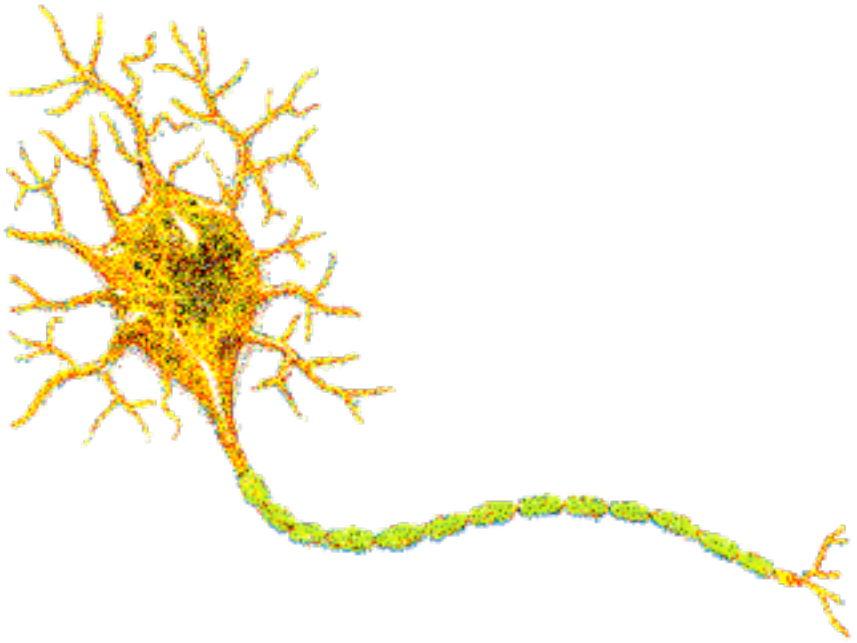
Biological School

It is all about the body!!!!

The Nervous System



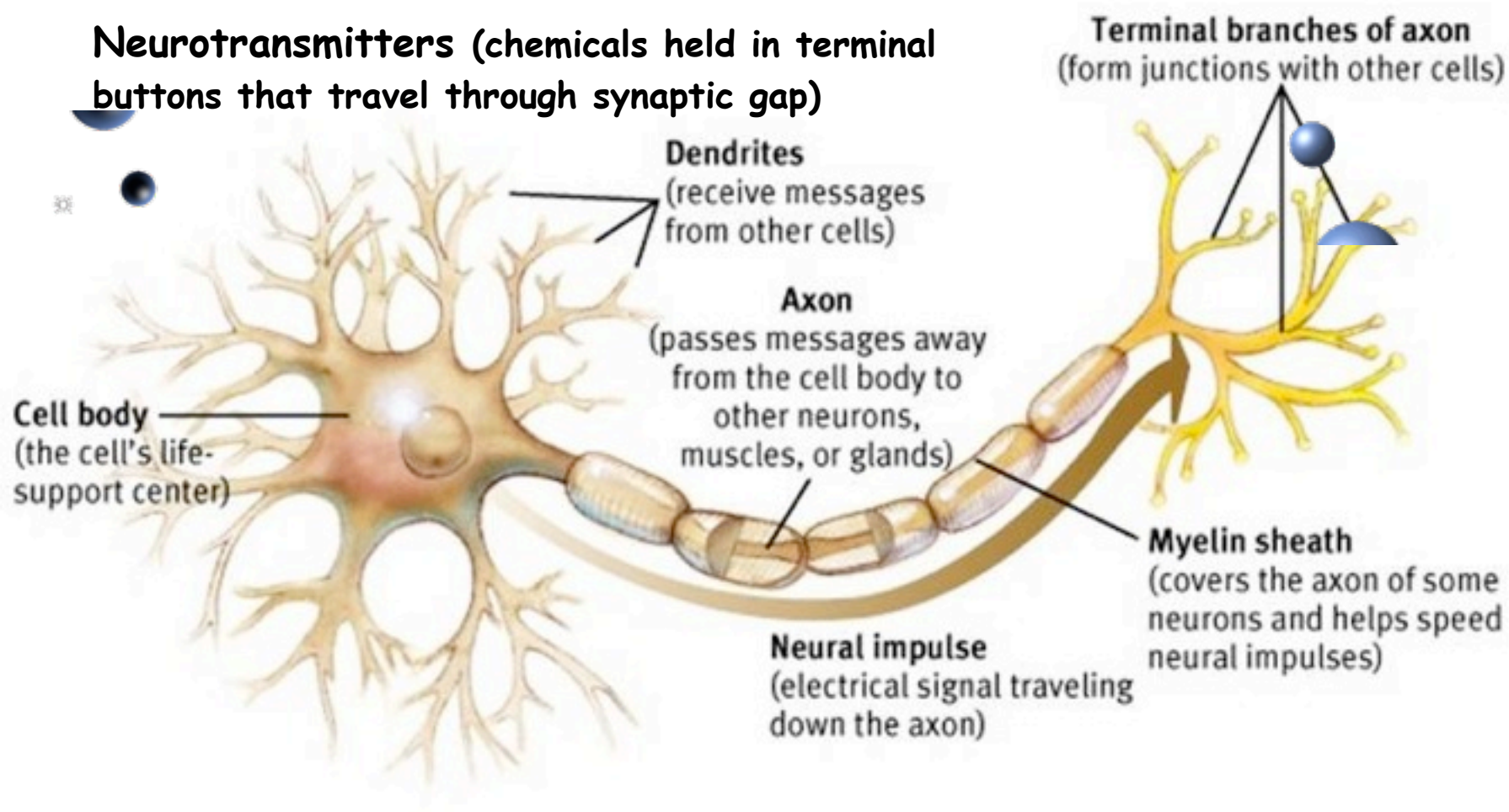
It starts with an individual nerve cell called a NEURON.

Neuroanatomy

Synapse

Synapse

Neurotransmitters (chemicals held in terminal buttons that travel through synaptic gap)



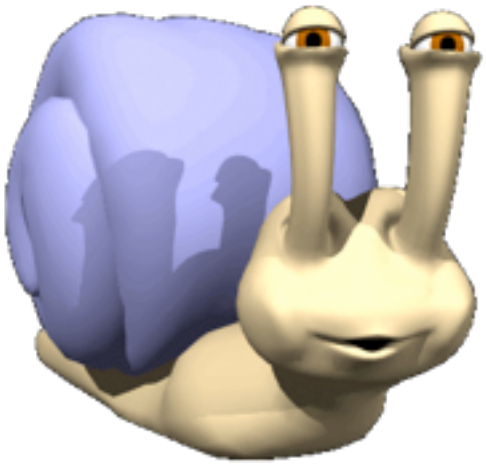
How does a Neuron fire?

- **Resting Potential**: slightly negative charge.
- Reach the **threshold** when enough neurotransmitters reach dendrites.
- Go into **Action Potential**.
- **All-or-none response**.
- Transfer of ions across axon's membrane causes electrical charge.

TYPES OF

Acetylcholine (ACH)

- Deals with motor movement and memory.
- Too much and you will….
- Too little and you will…
- Lack of ACH has been linked to Alzheimer's disease.



Dopamine

- Deals with motor movement and alertness.
- Lack of dopamine has been linked to Parkinson's disease.
- Too much has been linked to schizophrenia.

Serotonin

- Involved in mood control.
- Lack of serotonin has been linked to clinical depression.

Endorphins

- Involved in pain control.
- Many of our most addictive drugs deal with endorphins.

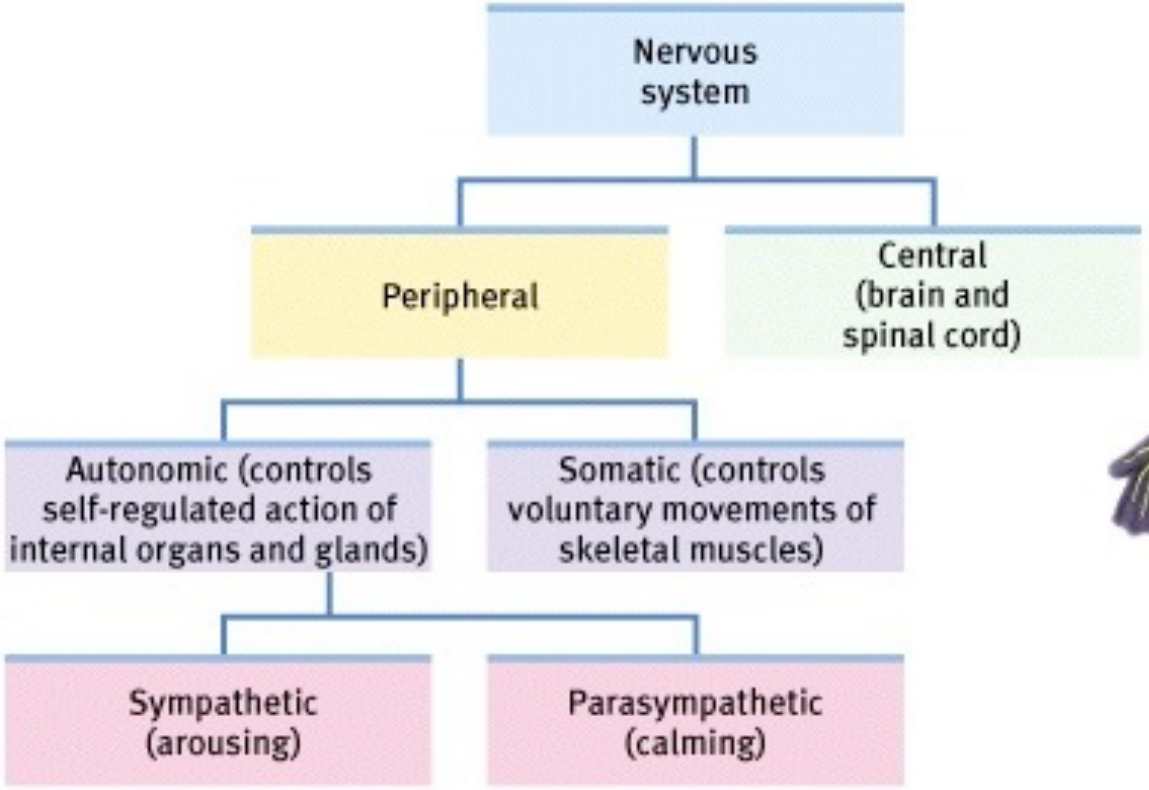
Drugs can be…..

- **Agonists**- make neuron fire
- **Antagonists**- stop neural firing
- **Reuptake Inhibitors-** block reuptake

Types of Neurons

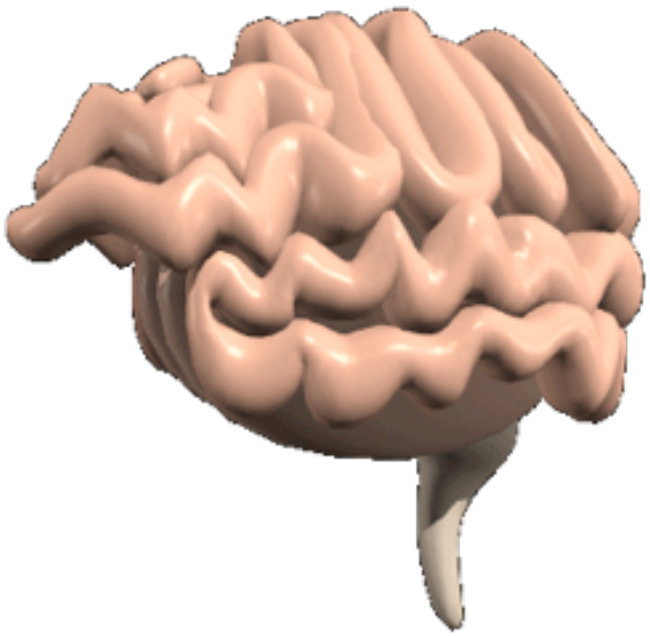
- Efferent (Motor) Neurons
- Interneurons
- Afferent (Sensory) Neurons

The Nervous System



Central Nervous System

- The Brain and spinal cord
- CNS



Peripheral Nervous System

- All nerves that are not encased in bone.
- Everything but the brain and spinal cord.
- Is divided into two categories….**somatic** and **autonomic**.

Somatic Nervous System

- Controls voluntary muscle movement.
- Uses motor (efferent) neurons.

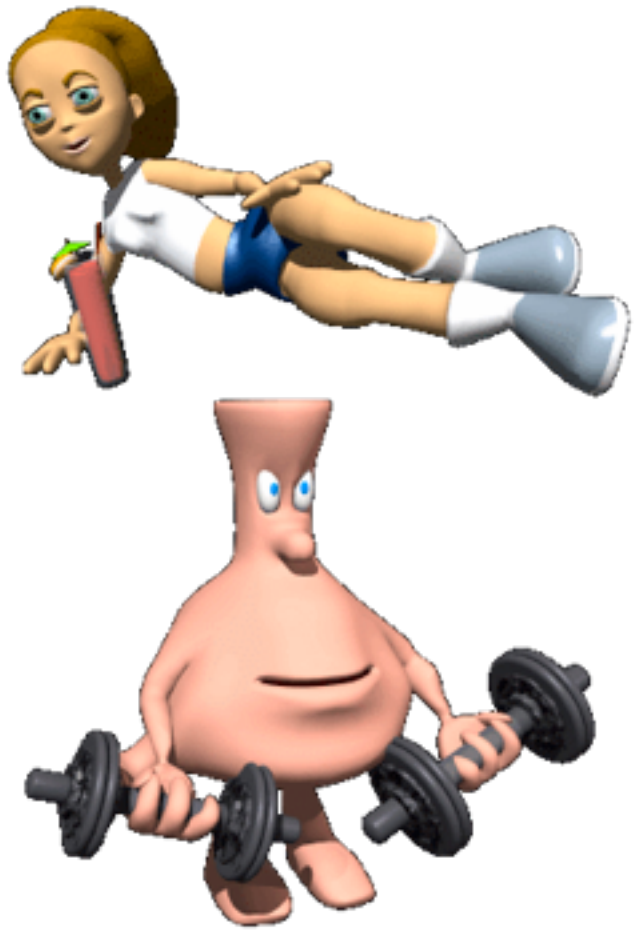
Autonomic Nervous System

- Controls the automatic functions of the body.
- Divided into two categories…the **sympathetic** and the **parasympathetic**

Sympathetic Nervous System

- Fight or Flight Response.
- Automatically accelerates heart rate, breathing, dilates pupils, slows down digestion.

Parasympathetic Nervous System

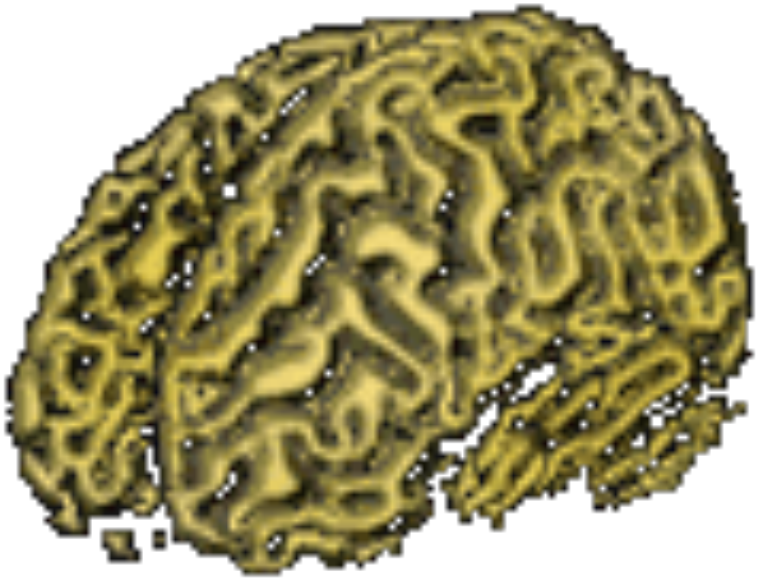


- Automatically slows the body down after a stressful event.
- Heart rate and breathing slow down, pupils constrict and digestion speeds up.

Reflexes

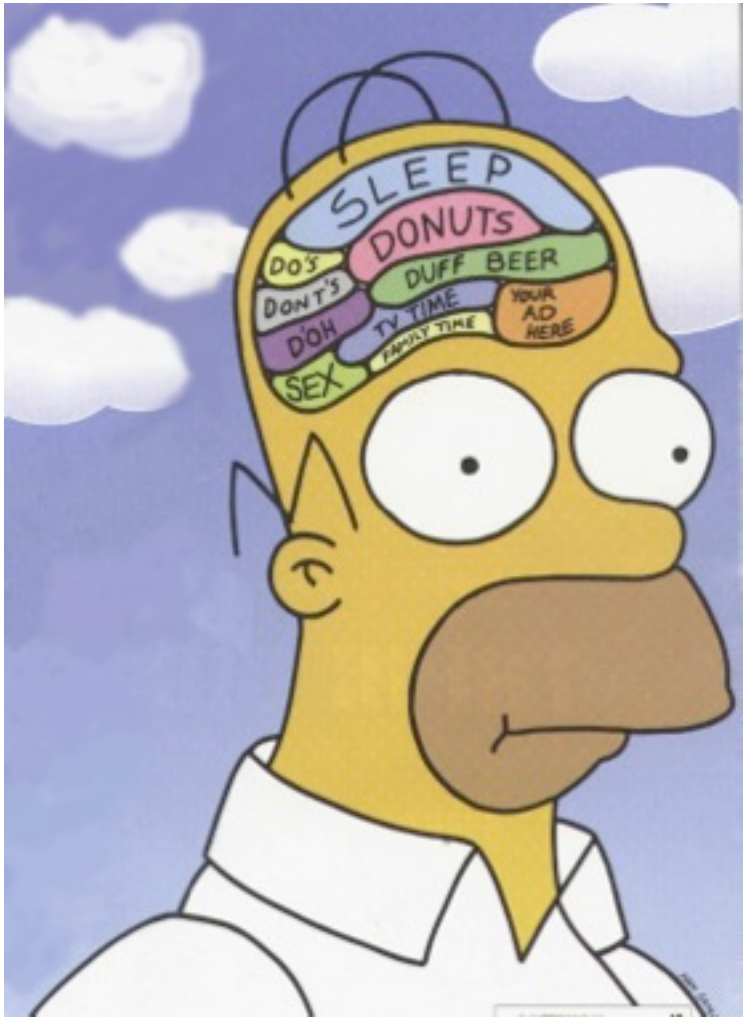
- Normally, sensory (afferent) neurons take info up through spine to the brain.
- Some reactions occur when sensory neurons reach just the spinal cord.
- Survival adaptation.

The Brain



- Made up of neurons and glial cells.
- Glial cells support neural cells.

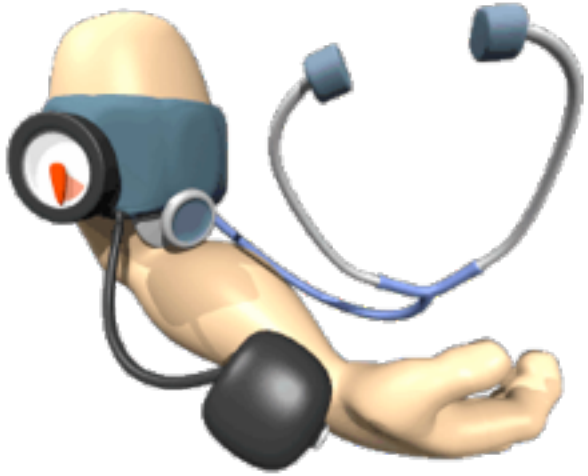
Brain Structures



- Some scientists divide the brain up into three parts.
- Hindbrain
- Midbrain
- Forebrain

Medulla Oblongata

- Heart rate
- Breathing
- Blood Pressure

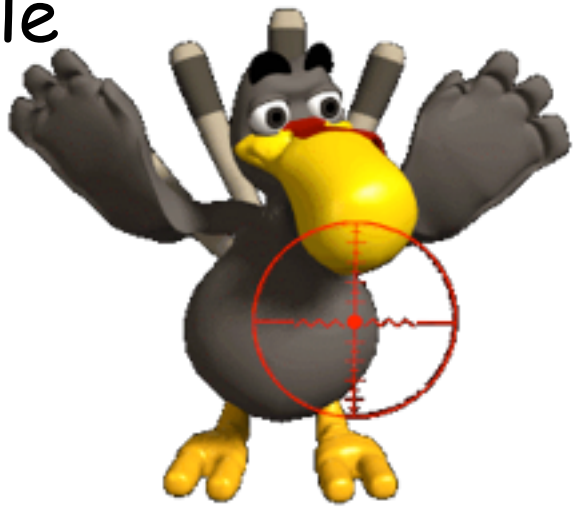


Pons

- Connects hindbrain, midbrain and forebrain together.
- Involved in facial expressions.

Cerebellum

- Located in the back of our head- means little brain.
- Coordinates muscle movements.
- Like tracking a target.

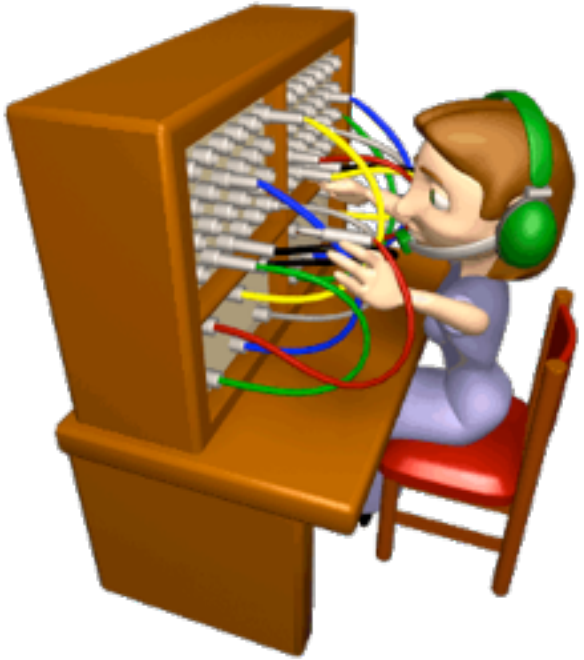


Midbrain

- Coordinates simple movements with sensory information.
- Contains the **reticular formation**: arousal and ability to focus attention.

Thalamus

- In Forebrain
- Receives sensory information and sends them to appropriate areas of forebrain.
- Like a switchboard.
- Everything but smell.



Limbic System

- EMOTIONAL CONTROL CENTER of the brain.
- Made up of Hypothalamus, Amygdala and Hippocampus.

Hypothalamus

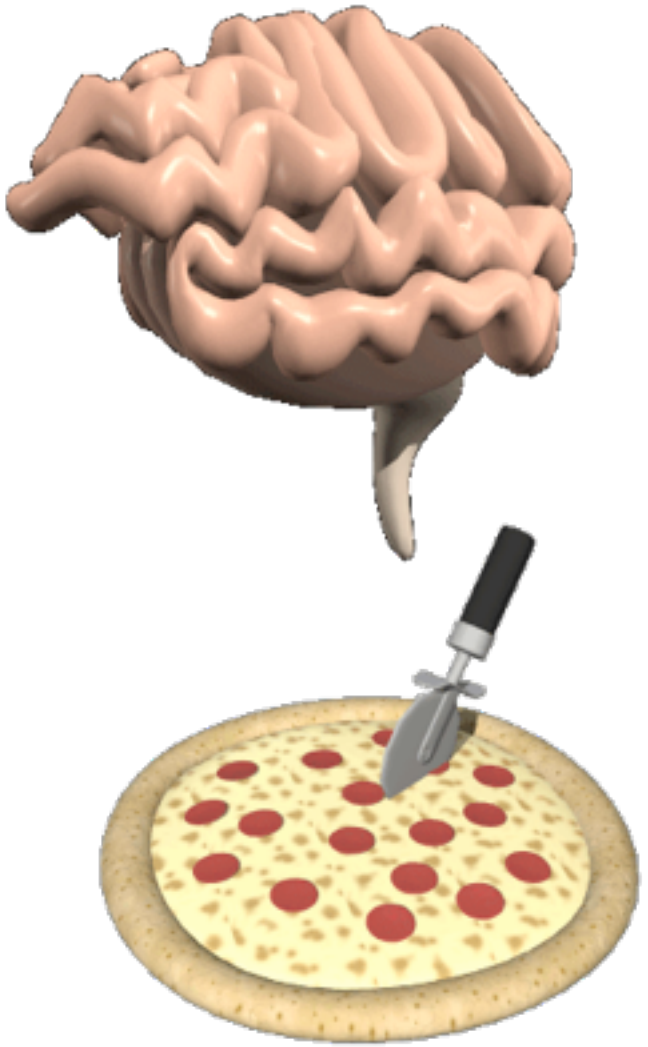
- Pea sized in brain, but plays a not so pea sized role.
- Body temperature
- Hunger
- Thirst
- Sexual Arousal (libido)

Hippocampus and Amygdala

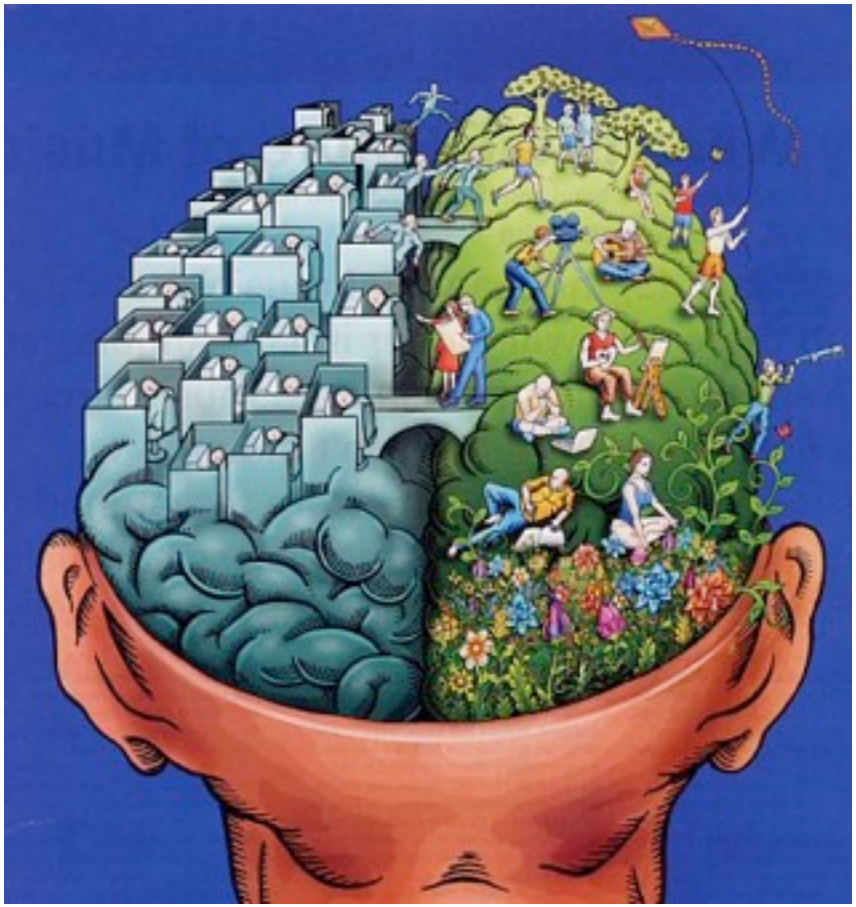
- **Hippocampus** is involved in memory processing.
- **Amygdala** is vital for our basic emotions.

Cerebral Cortex

- Top layer of our brain.
- Contains wrinkles called fissures.
- The fissures increase surface area of our brain.
- Laid out it would be about the size of a large pizza.



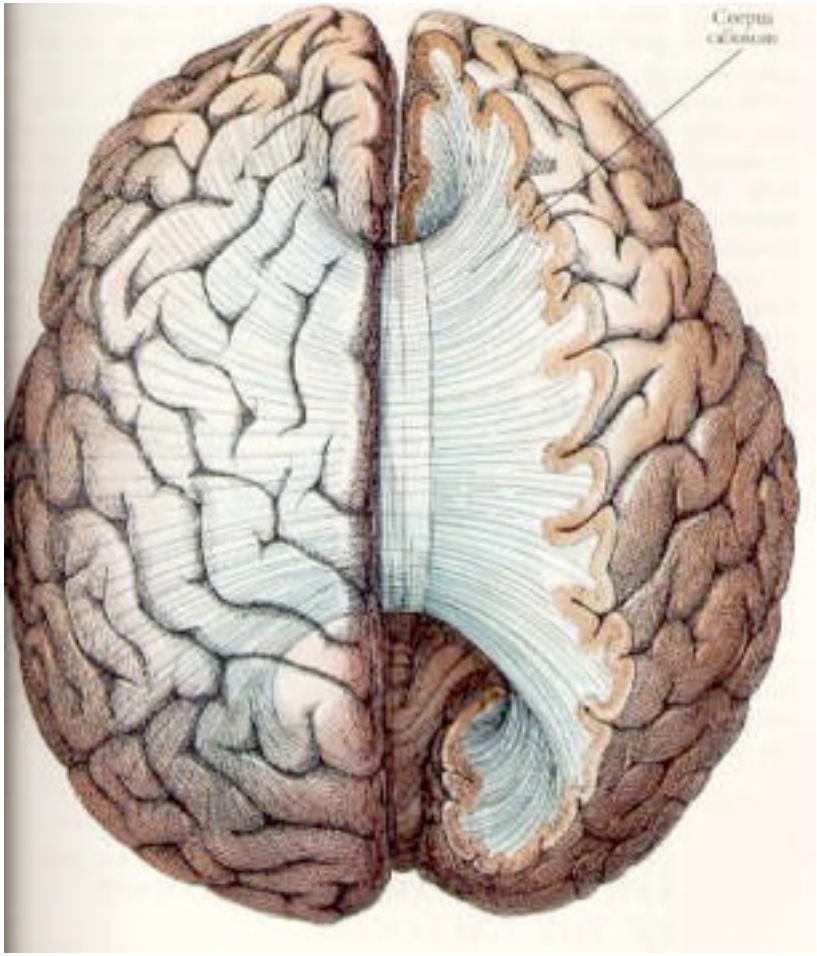
Hemispheres



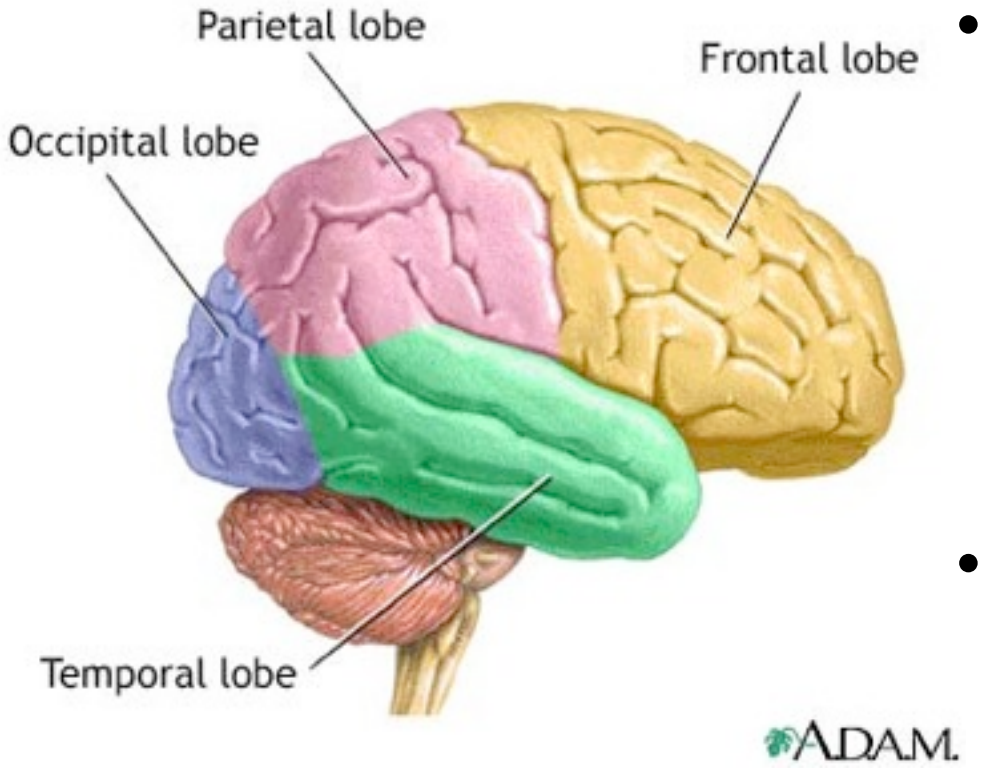
- Divided into a left and right hemisphere.
- Contralateral controlled- left controls right side of body and vice versa.
- Brain Lateralization.
- Lefties are better at spatial and creative tasks.
- Righties are better at logic.

Split-Brain Patients

- Corpus Collosum attaches the two hemispheres of cerebral cortex.
- When removed you have a split-brain patient.



Areas of the Cerebral Cortex



- Divided into eight lobes, four in each hemisphere (frontal, parietal, occipital and temporal).
- Any area not dealing with our senses or muscle movements are called **association areas**.

Frontal Lobe

- Deals with planning, maintaining emotional control and abstract thought.
- Contains Broca's Area.
- Broca's Aphasia.
- Contains Motor Cortex.

Parietal Lobes

- Located at the top of our head.
- Contains the somato-sensory cortex.
- Rest are association areas.

Temporal Lobes

- Process sound sensed by ears.
- Not lateralized.
- Contains Wernicke's area.
- Wernicke's Aphasia.

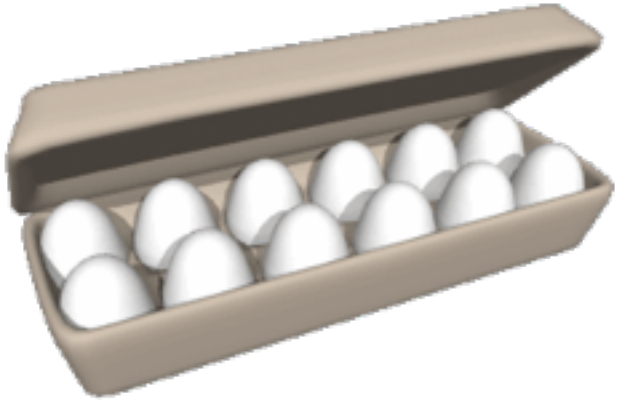
Occipital Lobes

- In the back of our head.
- Handles visual input from eyes.
- Right half of each retina goes to left occipital lobe and vice versa.

Brain Plasticity

- The ability for our brains to form new connections after the neurons are damaged.
- The younger you are, the more plastic your brain is.

Endocrine System



- System of glands that secrete hormones.
- Controlled by the hypothalamus.
- Ovaries and Testes.
- Adrenal Gland